WORK-IN-PROGRESS (OCTOBER 23, 2011) PARALLEL CHART FOR

58:2 ("The Urantia Atmosphere")

Key

(a) Green indicates where a source author first appears, or where he/she reappears.

(b) Yellow highlights most parallelisms.

(c) Tan highlights parallelisms not occurring on the same row, or parallelisms separated by yellowed parallelisms.

(d) An underlined word or words indicates where the source and the UB writer pointedly differ from each other.

(e) Blue indicates original (or "revealed") information, or UB-specific terminology and concepts. (What to highlight in this regard is debatable; the highlights are tentative.)

(f) Pink points to a word in the first edition of *The Urantia Book* which was changed in a later edition, by either the Urantia Foundation or the Standard Reference Edition committee.

Source for 58:2

(1) Dr. Harlan True Stetson, "Solar Radiation and the State of the Atmosphere," *The Scientific Monthly*, Vol. 54, No. 6 (June 1942)

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PAPER 58 — LIFE ESTABLISHMENT ON URANTIA

2. THE URANTIA ATMOSPHERE

"SOLAR RADIATION AND THE STATE OF THE ATMOSPHERE" (Stetson 513)

Because of the relatively insignificant size of the earth, and also the great distance that separates us from the sun a distance of 93 million miles, our planet can intercept but about one two billionths of the total solar output (S 514).

58:2.1 The planetary atmosphere filters through to the earth about one two-billionths of the sun's total light emanation.

At a price of 1¾ cents per kilowatt hour, the annual budget that would have to be allowed for sunshine for the continental United States alone

If the light falling upon North America were paid for at the rate of two cents per kilowatt-hour, the annual light bill

would represent an expenditure of 327 quadrillion dollars (S 514).

would be upward of 800 quadrillion dollars.

If we change our picture to a more restricted one, we can say that the cost of sunshine for Greater New York at the above figure would amount to approximately 100 million dollars for the average day (S 514).

Chicago's bill for sunshine would amount to considerably over 100 million dollars a day.

If we analyze the radiation from the sun we discover that it covers a wide range of wave-lengths. Certain of these wave-lengths or frequencies produce their own special effects upon the earth and its atmosphere (S 514).

And it should be remembered that you receive from the sun other forms of energy—

light is not the only solar contribution reaching your atmosphere.

SOURCE OR PARALLEL	THE URANTIA BOOK
[Outside the] so-called visible range to which the eye responds there is a vast scale of radiations both beyond the red end of the spectrum, which we call the infrared, and far down below the violet, which we call the ultra-violet (S 514).	Vast solar energies pour in upon Urantia embracing wave lengths ranging both above and below the recognition range of human vision.
Observations with the spectroscope indicate that there is much radiation at the extreme ultra-violet end of the spectrum to which the earth's atmosphere is completely opaque.	58:2.2 The earth's atmosphere is all but opaque to much of the solar radiation at the extreme ultraviolet end of the spectrum.
A great deal of the absorption of this region of the solar spectrum of very short wave-lengths is caused by a layer of ozone which exists at an average height of about 22 kilometers [*13.67 miles*],	Most of these short wave lengths are absorbed by a layer of ozone which exists throughout a level about ten miles above the surface of the earth,
but which probably occupies a region extending from 15 to 35 kilometers [*9.321 miles to 21.749 miles*].	and which extends spaceward for another ten miles.
If all the ozone in this region were to be brought to the standard conditions of temperature and pressure of our atmosphere at the earth's surface, it would represent a layer of only 2 to 3 millimeters in thickness. [*0.0788 to 0.1182 inches*]	The ozone permeating this region, at conditions prevailing on the earth's surface, would make a layer only one tenth of an inch thick;
Yet this small amount of ozone is the defense between us and extremely dangerous radiations in the ultra-violet region of the sun's light (S 516).	nevertheless, this relatively small and apparently insignificant amount of ozone protects Urantia inhabitants from the excess of these dangerous and destructive ultraviolet radiations present in sunlight.
Were this absorption, however, of this region of the solar spectrum even a little greater than it is,	But were this ozone layer just a trifle thicker,
we should be deprived of that small amount of ultra-violet light filtering through our atmosphere that is so essential for health	you would be deprived of the highly important and health-giving ultraviolet rays which now reach the earth's surface,

and the production of our sunshine vitamin D (S 516).

and which are ancestral to one of the most essential of your vitamins.

58:2.3 And yet some of the less imaginative of your mortal mechanists insist on viewing material creation and human evolution as an accident. The Urantia midwayers have assembled over fifty thousand facts of physics and chemistry which they deem to be incompatible with the laws of accidental chance, and which they contend unmistakably demonstrate the presence of intelligent purpose in the material creation. And all of this takes no account of their catalogue of more than one hundred thousand findings outside the domain of physics and chemistry which they maintain prove the presence of mind in the planning, creation, and maintenance of the material cosmos.

We can be confident, however, that it is a fortunate combination of the sun and our atmosphere that makes life on the earth possible. The sun not only radiates its health-giving sunshine, but it also emits literally death-dealing rays (S 516).

58:2.4 Your sun pours forth a veritable flood of death-dealing rays,

and your pleasant life on Urantia is due to the "fortuitous" influence of more than two-score apparently accidental protective operations similar to the action of this unique ozone layer.

SOURCE OR PARALLEL	THE URANTIA BOOK
[The atmosphere] is a sort of buffer state, the very top of which receives a violent bombardment of high frequency radiations from the sun, and the lower layers of which form a blanket that enables the earth to retain during the night much of the warmth generated by the sunshine that has penetrated through it, thus mitigating the extremes of temperature between night and day to which the earth would otherwise be subjected (S 516-17).	58:2.5 Were it not for the "blanketing" effect of the atmosphere at night, heat would be lost by radiation
	so rapidly that life would be impossible of maintenance except by artificial provision.
[contd] If we look at a cross-section of the earth's atmosphere, it may for convenience be divided into three zones or layers in which the stratosphere occupies the middle ground. The region below the stratosphere is that which contacts our immediate surroundings and provides the winds and atmospheric currents, giving rise to all our weather. We call this lower region comprising perhaps the first 5 or 6 miles the troposphere.	58:2.6 The lower five or six miles of the earth's atmosphere is the troposphere; this is the region of winds and air currents which provide weather phenomena.
The region above the stratosphere is the ionosphere.	Above this region is the inner ionosphere and next above is the stratosphere.
If we send a recording thermometer aloft, we find that while passing through the troposphere the temperature steadily falls until a height of 10 or 12 kilometers [*6.214 to 7.4568 miles*] is reached,	Ascending from the surface of the earth, the temperature steadily falls for six or eight miles,
when the temperature reaches the extremely low value of -55º C., or some 68º below zero Fahrenheit.	at which height it registers around 70 degrees below zero F.

SOURCE OR PARALLEL	THE URANTIA BOOK
Strangely enough, for the next 30 miles or so there appears to be little change in temperature.	This temperature range of from 65 to 70 degrees below zero F. is unchanged in the further ascent for forty miles;
This is the region of the stratosphere (S 517).	this realm of constant temperature is the stratosphere.
At a height of 60 kilometers or some 40 miles, the temperature would begin to rise again.	At a height of forty-five or fifty miles, the temperature begins to rise,
Recent investigations give some evidence that at extreme heights, up where the auroral fires play, temperatures of 1,000º C. [*1832º F.*] have to be postulated	and this increase continues until, at the level of the auroral displays, a temperature of 1200° F. is attained,
to account for the presence of the ionized oxygen that is there.	and it is this intense heat that ionizes the oxygen.
The extremely rarefied condition of this upper atmosphere, however, calls for perhaps a quite different interpretation of temperature than that to which we are ordinary accustomed when determining temperatures by the thermometer at the earth's surface (S 517).	But temperature in such a rarefied atmosphere is hardly comparable with heat reckoning at the surface of the earth.
[contd] Ascending through the cross-sections of the atmosphere, we find there is a rapid decrease in the amount of atmospheric pressure. Within the first 3 miles from the earth's surface, half the total amount of oxygen and nitrogen, the principal atmospheric ingredients, are included.	Bear in mind that one half of all your atmosphere is to be found in the first three miles.
The limiting height to which the thinning atmosphere extends is somewhat difficult to fix. Perhaps we should place it at 200 to 300 miles, although recently Dr. Carl Störmer has observed auroral streamers reaching to heights of 600 kilometers [*372.84 miles*] or more. Where the auroral streamers go, some of the thin atmosphere must extend (S 517).	The height of the earth's atmosphere is indicated by the highest auroral streamers—about four hundred miles.

SOURCE OR PARALLEL	THE URANTIA BOOK
[contd] If we make a chart of the numbers and occurrences of aurorae we find there seems to be a curious connection between the frequency and brightness of auroral displays and the state of the sun as marked by the appearance of sunspots (S 517).	58:2.7 Auroral phenomena are directly related to sunspots,
It was in 1908 that the late Dr. George Ellery Hale, the founder and director of the Mount Wilson Observatory, first observed that sunspots were giant cyclones in the sun's atmosphere (S 518).	those solar cyclones
To carry the analogy still further, spots north of the sun's equator are in general whirling in one direction while corresponding spots south of the equator whirl in the opposite direction. If the rotation of the one is clockwise, that of the other is counter-clockwise.	which whirl in opposite directions above and below the solar equator,
This again is characteristic of the differences of rotation of tropical hurricanes on the earth originating in the northern and southern hemispheres, respectively (S 518).	even as do the terrestrial tropical hurricanes.
	Such atmospheric disturbances whirl in opposite directions when occurring above or below the equator.
When the Mount Wilson observers first examined and actually measured the frequency of light coming from the centers of sunspots, it was found to have changed frequency in exactly the way that light waves are distorted in the laboratory when a powerful electromagnet is placed around the source of light being examined (S 519).	58:2.8 The power of sunspots to alter light frequencies
Thus came the startling revelation that sunspots were not only terrific hurricanes but every center was in itself a powerful magnet (S 519).	shows that these solar storm centers function as enormous magnets.

SOURCE OR PARALLEL	THE URANTIA BOOK
Since a magnetic field may exert a repulsing effect upon swiftly moving electrons, we see some reason that charged electric particles can be actually hurled from sunspot centers at velocities which may carry them through space into the earth's atmosphere,	Such magnetic fields are able to hurl charged particles from the sunspot craters out through space to the earth's outer atmosphere,
thus ionizing the upper regions of the air in a way that would produce auroral displays.	where their ionizing influence produces such spectacular auroral displays.
In the light of such a mechanism, therefore, we see a possible reason why aurorae occur in greater numbers and at greater brilliance at times when these solar storms occur most frequently (S 519-20).	Therefore do you have the greatest auroral phenomena when sunspots are at their height—
There is, I believe, a good reason for the fact that the maximum in the auroral displays occurs a year or two after the year of most sunspots.	or soon thereafter—
As sunspots begin to wane in numbers, they are nevertheless occurring in regions progressively nearer the solar equator, and as the sun's equator is inclined but slightly to the plane of the earth's orbit, we may draw the inference that sunspots are most effectively associated with the aurorae when, other things being equal, they are most nearly in the geometrical plane that the earth travels in its journey around the sun (S 517-18).	at which time the spots are more generally equatorially situated.
Perhaps comparatively few who are not geomagneticians realize that the compass needle is constantly wandering back and forth every day by a slight amount. When the sun rises in the east, the north end of the compass needle turns slightly toward that direction (S 520-21).	58:2.9 Even the compass needle is responsive to this solar influence since it turns slightly to the east as the sun rises

SOURCE OR PARALLEL	THE URANTIA BOOK
Then in the afternoon as the sun wanders and sets in the west, the compass needle wanders likewise to the west, coming back again to its normal position about midnight when the sun is below the northern horizon.	and slightly to the west as the sun nears setting.
This goes on day after day, month after month—	This happens every day,
but during the years when sunspots are most numerous these daily excursions of the compass needle will on the average be twice as great as during the years when the sunspots are lacking.	but during the height of sunspot cycles this variation of the compass is twice as great.
These diurnal wanderings of the compass needle can now be roughly explained as due to the effects of ionization of the upper atmosphere by sunlight (S 521).	These diurnal wanderings of the compass are in response to the increased ionization of the upper atmosphere, which is produced by the sunlight.
Somebody experimenting with wireless and listening in found himself quite unconsciously eavesdropping on Marconi waves from the other side of the Atlantic.... This led Professor Kennelly of Harvard to postulate that there must exist high above the earth's surface, perhaps 100 miles or so up, an electrified conducting layer from which the electromagnetic waves emitted from the powerful antennae were reflected back to earth (S 521).	58:2.10 It is the presence of two different levels of electrified conducting regions
This region [*i.e.* the Kennelly-Heaviside layer, also designated as the E layer] lies far above the stratosphere and generally above the region that is usually regarded as that where ozone is manufactured.	in the superstratosphere

SOURCE OR PARALLEL	THE URANTIA BOOK
This E layer is particularly favorable for reflecting or turning back radio waves of the frequencies which are most generally used for commercial broadcasting in connection with our entertainment programs [*i.e.* medium wave]. Radio waves of much shorter wave-lengths or of higher frequencies penetrate and actually traverse through this region until they reach what appears to be another ionized region called the F layer, originally postulated by Professor Appleton in England (S 522).	that accounts for the long-distance transmission of your long- and short-wave radiobroadcasts.
During the last few years of sunspot activity, there have been occasions when remarkable fadeouts have occurred in radio communication (S 523).	Your broadcasting is sometimes disturbed
Could we visualize the ethereal substance of the ionosphere as we visualize the surface of the ocean, we should find times when terrific storms were raging in this ionosphere (S 524).	by the terrific storms which occasionally rage in the realms of these outer ionospheres.